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Effort-Reward Imbalance and Heavy Alcohol Consumption Among Humanitarian Aid Workers

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### Abstract

**Objective:** The purpose of the study was to explore the prevalence of heavy alcohol consumption and its association with stress-related working conditions - defined in terms of effort-reward imbalance (ERI) - among a large sample of humanitarian aid workers (HAWs) operating across four continents. Research has shown employee alcohol consumption has potential detrimental implications for health and work outcomes and is associated with exposure to work stressors. Research to identify links between stressful aspects of work and heavy alcohol consumption among HAWs could usefully inform the design of sector-specific interventions concerned with the reduction of alcohol consumption. **Method:** Questionnaire data were obtained from 1063 women and 917 men working in an international humanitarian agency. Logistic regression analyses were conducted separately for men and women (with different cut-off points to identify heavy drinking) to investigate the relationship between ERI and the risk of heavy alcohol consumption while controlling for a host of socio-demographic and occupational variables. **Results:** The prevalence of heavy alcohol consumption among women (18%) was higher than the corresponding rate for men (10%). Results lent support for the effort-reward perspective among women only: intermediate and high ERI in females was associated with a tripling of risk for heavy alcohol consumption. **Conclusions:** Interventions to reduce effort-reward imbalance among female HAWs might help to reduce heavy drinking within this population.

Humanitarian aid workers (HAWs) seek to aid, educate, and relieve suffering among the world's most vulnerable populations. They are the first to be deployed in a relief effort and operate in complex environments with challenges including civil conflicts, epidemics, extreme poverty, violence, and natural disasters (Eriksson et al., 2013). As such, they face a range of work-related stressors that may adversely affect their health and wellbeing (Holtz et al., 2002) and put them at increased risk for engagement in health-risk behaviours. One such behaviour is heavy alcohol consumption, defined by the World Health Organization as "a repeated pattern of drinking that confers the risk of harm" (Saunders & Lee, 2000, p. 95). There is a paucity of research concerning the prevalence and occupational correlates of heavy alcohol consumption among HAWs (Connorton et al., 2011); a knowledge gap the current study seeks to address using a large sample of HAWs operating across four continents.

Alcohol consumption may influence employee health, productivity, and safety outcomes (Frone, 2008b) and has been identified as a component cause for more than 200 health conditions (Rehm et al., 2010; Shield et al., 2013; WHO, 2014). For example, alcohol consumption has been linked to diseases such as hypertension and liver cirrhosis (e.g., Corrao et al., 2004); psychiatric illnesses such as depression and anxiety (e.g., Boden & Fergusson, 2011; Crum et al., 2013; Kessler, 2004; Kim, 2001); and infectious diseases such as tuberculosis and pneumonia (Rehm et al., 2009; Samokhvalov et al., 2010). Employee alcohol use has been linked to absenteeism (Bacharach et al., 2010; Frone, 2008b; Head et al., 2004; McFarlin & Fals-Stewart, 2002; Salonsalmi et al., 2015) in addition to high job turnover rates, reduced work performance, co-worker conflict, increased risk-taking behaviour, work-related accidents, higher health benefit costs, and workplace aggression (Heather, 1994; Mangione et al., 1999; McFarlin et al., 2001; McFarlin & Fals-Stewart, 2002; Webb et al., 1994).

Given the potential detrimental effects of alcohol consumption for employees' health and work outcomes, the examination of occupational correlates of heavy alcohol consumption has increased in recent years; a key focus of this research has been on psychosocial (stress-related) working conditions concerned with the design, management, and organisation of work (e.g., Biron et al., 2011; Crum et al., 1995; Frone, 2008a; Gimeno et al., 2009; Liu et al., 2009; Saade & Marchand, 2012). This literature posits that alcohol use represents a "mode of relief and self-medication" (Biron et al., 2011, p. 251), i.e., a coping strategy for reacting to and dealing with negative emotions elicited by exposure to work stressors (Carpenter & Hasin, 1999; Frone, 2008b). Individuals may consume alcohol to reduce negative affect or to enhance positive affect (Wills & Shiffman, 1985).

Effort-Reward Imbalance (ERI; Siegrist, 1996) is one model of how the psychosocial work environment may influence alcohol use. ERI theory posits that an imbalance between an individual's perceptions of their occupational rewards and effort expended can result in a lack of reciprocity that threatens self-regulatory functions (i.e., mastery, efficacy, and esteem). This can cause a state of emotional distress that carries the potential for behaviours that are risky to health (Cox & Griffiths, 2010; Zurlo et al., 2010). Rewards include esteem, salary, career opportunities, and job security. The model differentiates between extrinsic efforts -- job conditions such as demands and obligations -- and intrinsic efforts that reflect a personal coping style or over-commitment (OC). This excessive devotion to work exacerbates the negative effects of effort-reward imbalance (Siegrist, 1996).

Links between ERI and alcohol consumption have been demonstrated in a number of studies with stronger associations usually found in men (Bobak et al., 2005; Head et al., 2004; Siegrist & Rödel, 2006; Stansfeld et al., 2000). The literature is not, however, consistent in its

findings. For instance, Finnish research found no significant relationship between ERI and heavy drinking among men and, contrary to expectations, a significantly lower likelihood of heavy drinking among females reporting intermediate ERI compared to females reporting low ERI (Kouvonen et al., 2005).

Few studies in the humanitarian literature have examined the prevalence of alcohol consumption and among these only a minority have separately considered expatriates (international, working in a country other than their native one) and locals (national, recruited from the host population). Expatriates face unique personal and professional challenges and rewards such as financial incentives, separation from significant others, and difficulties in adjusting to the host country environment (Black & Gregersen, 1999; Black & Mendenhall, 1991). Local workers report tensions due to inequality of treatment between expatriate and local/national staff (Ager, Pasha, Yu, Duke, Eriksson, Cardozo, 2012). Cardoza et al. (2005) found 16.2% of expatriate and 2.5% of local Kosovar Albanian aid workers drank at heavy levels. In similar occupational contexts, both Britt and Adler (1999) (medical humanitarian expatriates) and Mehlum (1999) (United Nations peacekeepers) found an increase in alcohol consumption during missions, a finding not replicated in a study of American Red Cross disaster relief workers (Simons et al., 2005). Humanitarian aid worker research typically involves small samples based in a single country and rarely compares local and expatriate workers (Connorton et al., 2011). To date, no studies have explored relations between psychosocial work conditions and alcohol consumption among HAWs.

### **Aims of the Current Study**

This is the first study to our knowledge that has utilised a theoretical model of job stress in the humanitarian context and to consider this in relation to alcohol consumption. The ERI

model is particularly appropriate given its applicability to occupations that involve person-based interactions (Marmot et al., 1999). The purpose of the study is to establish the prevalence of heavy alcohol consumption and its association with psychosocial work conditions among HAWs. Knowledge of the prevalence of heavy alcohol consumption and its occupational correlates could inform the design and targeting of sector-specific interventions to reduce problematic alcohol consumption.

## **Method**

### **Participants and Procedure**

Participants were expatriate and local employees of a humanitarian organisation that operates in more than one hundred international locations. This multilateral organisation is financially supported by many countries and provides assistance to people affected by complex humanitarian disasters or crises (Archer, 2003).

In 2014 all employees ( $N = 9062$ ) were sent an email inviting them to participate in an online survey. The email detailed the purpose of the survey and assured participants of anonymity and confidentiality. No incentives were offered. Ethical approval was granted by Webster International Institutional Review Board and the research followed the British Psychological Society's (2014) code of human research ethics.

### **Measurement**

#### *Independent Variables*

*Effort-reward imbalance.* This study used the abbreviated ERI questionnaire (Siegrist, 1996) that has been employed widely in occupational health studies (Bosma et al., 1998; Peter & Siegrist, 1997; Stansfeld et al., 1998) and comprises 16 Likert-scaled items scored on a 4-point

scale (1= *strongly disagree*, 2= *disagree*, 3= *agree*, 4= *strongly agree*). Effort (three items,  $\alpha = .77$ ) is defined as the demanding aspects of the work environment (e.g., I have constant time pressure due to a heavy work load. Reward (seven items,  $\alpha = .75$ ) is operationalized as: (a) esteem reward (2 items,  $\alpha = .74$ , e.g., I receive the respect I deserve from my superiors); (b) reward related to promotion prospects (three items,  $\alpha = .63$ , e.g., my job promotion prospects are poor); and (c) job security (two items,  $\alpha = .52$ , e.g., I have experienced or I expect to experience an undesirable change in my work situation). The over-commitment sub-scale (six items,  $\alpha = .81$ ) measures an exhaustive coping style with the demands of work (e.g., people close to me say I sacrifice too much for my job). Responses are summed for each scale and the ERI ratio is calculated to assess the degree of imbalance between high cost and low gain at work as follows:  $\text{effort} / (\text{reward} \times \text{correction factor})$ . The correction factor compensates for the differing number of items in the two scales (number of reward items as nominator divided by number of effort items as denominator) – in this study  $3/7 = 0.43$ . Following convention in the work-related stress scientific literature (e.g., Kivimaki, et al., 2002; Kouvonen et al., 2005), the resultant ERI score was divided into tertiles. A high risk group (high efforts in relation to rewards) formed the upper tertile and the lowest risk group (reference/baseline) indicated the position of low efforts relative to rewards. The sum over-commitment score was similarly divided into tertiles.

### *Dependent Variables*

*Alcohol consumption.* The Alcohol Use Disorders Identification Test – Consumption (AUDIT-C; Bush et al., 1998) was used to assess alcohol consumption. This brief validated screening tool has been used in several contemporary studies involving workers in 'high-stress' occupations, such as military personnel (Whybrow et al., 2016), firefighters (Piazza-Gardner et al., 2014), veterinary surgeons (Bartram et al., 2009), and emergency department staff (Nordqvist



et al., 2004). The measure includes three questions ( $\alpha = .65$ ) concerning the frequency and quantity of alcohol consumption: “How often do you have a drink containing alcohol?” (never = 0 point; monthly or less = 1 point; 2-4 times a month = 2 points; 2-3 times a week = 3 points; 4 or more times a week = 4 points), “How many drinks containing alcohol do you have on a typical day when you are drinking?” (1 or 2 = 0 points; 3 or 4 = 1 point; 5 or 6 = 2 points; 7-9 = 3 points; 10 or more = 4 points), and “How often do you have six or more drinks on one occasion?” (never = 0 points; less than monthly = 1 point; monthly = 2 points; weekly = 3 points; daily or almost daily = 4 points). A sum score for the scale was calculated with possible scores ranging from 0-12.

For analytical purposes alcohol consumption was treated as a dichotomous variable with ‘non-heavy’ and ‘heavy’ categories. Dichotomisation was undertaken because (i) the AUDIT-C instrument was designed to identify ‘at risk’ individuals, which is desirable in the context of research that seeks to inform the design of tailored and targeted workplace health promotion interventions, (ii) skew and kurtosis scores violated parametric assumptions thereby hindering the application of hierarchical linear regression, and (iii) dichotomisation of AUDIT-C scores is common practice in the occupational health scientific literature (e.g., Bartram et al., 2009; Dawson et al., 2005; Neumann et al., 2012; Nordqvist et al., 2004; Piazza-Gardner et al., 2014; Whybrow et al., 2016) and therefore facilitated comparison of findings from the current study with those conducted among other ‘high stress’ occupational groups. Tuunanen et al. (2007) recommend that cut-off scores for the identification of heavy consumption should be tailored to the populations under examination; following precedent (Aalto et al., 2009; Dawson et al., 2005; Neumann et al., 2012), scores  $\geq 6$  in men and  $\geq 4$  in women identified heavy drinking.

#### *Covariates*

*Demographics.* Information was collected on age, gender, marital status, family status (having children under 18 at home), expatriate (international), or local (national) status, years in the field, and geographical region of current operation.

*Post-traumatic stress disorder and secondary traumatic stress.* There is known to be an association between heavy alcohol consumption and both post-traumatic stress disorder (PTSD) and secondary traumatic stress (Deahl et al., 2001; McLean et al., 2014), which renders it important to adjust for these outcomes when examining the relationship between ERI and alcohol use. PTSD symptoms were assessed using the PCL-6 (PTSD Checklist, abbreviated civilian version), a well-established self-report measure with good psychometric properties (Wilkins et al., 2011). The items ask respondents to rate the degree to which they were bothered by symptoms related to a stressful experience in the past month on a 5-point rating scale, where 1 = *not at all*, 2 = *a little bit*, 3 = *moderately*, 4 = *quite a bit*, and 5 = *extremely*. The Cronbach's alpha coefficient was .90.

The Secondary Traumatic Stress Scale (STSS; Bride et al., 2004) was designed to assess the frequency of intrusion, avoidance, and arousal symptoms associated with indirect exposure to traumatic events. The STSS (17 items,  $\alpha = .94$ ) assesses a set of symptoms similar to those of posttraumatic stress disorder (APA, 2000). Respondents are instructed to indicate how frequently the statement made by each item was true for them in the past seven days using a 5-point Likert-scale (1 = *never*, 2 = *rarely*, 3 = *occasionally*, 4 = *often*, and 5 = *very often*). A cut-off of 38 or above was used for STSS scores, indicating the presence of secondary stress (Bride, 2007).

The measures reported in the current paper formed part of a questionnaire that examined a broad range of constructs and experiences; these will be reported in forthcoming papers.

*Analytic strategy.*

Descriptive statistics (mean, standard deviation) were calculated for each of the study variables. Logistic regression analyses were conducted to examine the association of work stress variables with alcohol consumption. Adjusted odds ratios (ORs) and their 95% confidence intervals were calculated for the prevalence of heavy alcohol consumption according to work stress indicators. Analyses were stratified by gender as differential gender associations between stressors and drinking-related outcomes have previously been reported (Rospenda, Fujishiro, Shannon & Richman, 2008).

Covariates that were significantly correlated with alcohol consumption (in preliminary univariate analyses) were controlled in logistic regression analyses. Missing data were excluded pairwise as recommended by Pallant (2010). As a result of missing data, the total number of participants differs for each variable under consideration. Data analysis was conducted using IBM SPSS version 22.

**Results**

Of the 9062 employees invited to participate, 1980 evaluable questionnaires were returned, producing a response rate of 22%. The demographic and occupational profile of the respondent sample reflected that of the population with a slight variation for gender (Table 1).

--Insert Table 1 about here--

**Descriptive Statistics**

Most respondents were between 35 and 44 years old ( $n=697$ ). The mean age was 40.73 years ( $SD=9.35$ ). Women comprised 53.7% of the sample ( $n=1063$ ) and men 46.3 % ( $n=917$ ).

Table 2 reports alcohol consumption patterns. Nearly 2 out of 5 respondents (35%, 95% CI: 32.7–36.9) reported not drinking alcohol. Three out of twenty (15%, 95% CI: 13.6–16.8)

respondents drank two or three times a week, and 8% (95% CI: 6.5–10.1) of men and 7% (95% CI: 5.4–8.3) of women drank four or more times a week.

Less than 3% of respondents who drink consumed more than five drinks of alcohol on a typical day when drinking. Heavy episodic drinking ( $\geq 6$  drinks on a single occasion) occurred at least weekly for just over one in twenty men (6%, 95% CI: 4.9–8.1) and one in fifty women (2%, 95% CI: 1.3–3.1). There were significant differences between men and women in the frequency of drinking ( $p < .05$ ), typical quantity consumed ( $p < .001$ ), and frequency of heavy episodic drinking ( $p < .001$ ).

--Insert Table 2 about here--

Table 3 presents the proportion of respondents at risk for heavy alcohol consumption, high ERI, and high OC. Cross-tabulations (Pearson chi-squares) between the socio-demographic variables, ERI, OC, and heavy drinking are also presented. The prevalence of heavy drinking among women was 18% and among men 10%. Married/co-habiting respondents reported lower levels of alcohol consumption than who were not married/co-habiting. Respondents with no children at home were significantly more at risk for high alcohol consumption and high ERI than those with children at home.

--Insert Table 3 about here--

In Table 4, the findings for regions show a significant difference for all outcome measures (ERI, OC, and heavy drinking). In Switzerland, 32% were at risk for heavy alcohol consumption, approximately double the proportion at risk in other regions (range between 8% and 17%). There was a significant difference between expatriates (21% at risk) and locals (9% at risk) for heavy alcohol consumption (expatriates more than twice as likely to be at risk) but no significant difference was found for ERI or OC.

--Insert Table 4 about here--

Secondary traumatic stress was significantly associated with alcohol consumption, while post-traumatic stress disorder was not.

--Insert Table 5 about here--

### **ERI and Heavy Drinking**

Table 6 shows results from logistic regression models based on the total study population. In addition to crude findings, results were adjusted for age, gender, family status, marital status, expatriate/local status, and region (Model 1). Further adjustment was made for post-traumatic stress disorder and secondary stress (Model 2).

--Insert Table 6 about here--

In the fully adjusted model, women with both intermediate and higher levels of ERI were significantly more likely to report heavy drinking than women with low ERI (OR 3.17, 95% CI: 1.47 – 6.89, OR 3.38, 95% CI: 1.49 – 7.68 respectively). Over-commitment was not linked to heavy alcohol consumption.

### **Discussion**

This is the first study to establish the prevalence of heavy alcohol consumption and its association with theory-based psychosocial work conditions among humanitarian aid workers. We found that the prevalence rate for heavy alcohol consumption among women (18%) was almost double the corresponding rate for men (10%). Results of logistic regression analyses lent support for the effort-reward perspective among women only: intermediate and high ERI in females was associated with a tripling of risk for heavy alcohol consumption.

The prevalence of heavy alcohol consumption found in the current study was considerably lower than that found in studies that have used the same assessment instrument in

relation to United Kingdom vets (Bartram, 2009) and Australian police (Davey, Obst, & Sheehan, 2000). Our findings are similar to those found among police and ambulance personnel in Norway (Sterud et al., 2007). Our finding of women being at greater risk for heavy alcohol consumption than men is uncommon (Nolen-Hoeksema, 2004). Nevertheless, some studies suggest the gender difference in drinking and alcohol-related problems has decreased (Grant, 1997, Johnston, O'Malley, Hackman, 2002; Nelson et al., 1998) and recent police research has found a greater proportion of women at risk for heavy alcohol consumption than men (Houdmont, 2015). Further research is required to better understand this possible emerging trend in human service, high-stress occupations.

One-third of participants operating out of Switzerland were at risk for heavy alcohol consumption, double the proportion in other regions. High-income countries such as Switzerland have the highest alcohol consumption per capita (World Health Organization, 2004), which may in part explain our results. Both this study (across all regions) and that of Cardoza et al. (2005) (Kosovar Albania only) report a higher prevalence of heavy alcohol consumption in expatriate employees compared to local employees. High and intermediate ERI was significantly associated with heavy alcohol consumption among women only. In contrast, other working population studies have found the strongest associations between effort-reward imbalance and alcohol problems in men (Head et al., 2004; Siegrist & Rödel, 2006). Further clarification on these divergent health outcomes by gender and employment type is warranted.

Heavy drinking is a preventable and modifiable risk factor for employee health. Examining variables related to drinking habits can usefully provide an evidence base capable of informing targeted prevention and intervention activities. The current findings identify the psychosocial work environment as a risk factor for heavy alcohol consumption among HAWs,

suggesting that further research is required to (a) identify the specific psychosocial work characteristics experienced as problematic by such employees and (b) explore the extent to which these characteristics might be receptive to modification. This study also revealed differences in heavy alcohol consumption by gender, region, and employee type. This suggests a role for interventions involving employee education on the risks of heavy drinking and consumption reduction strategies that are tailored to the needs of specific employee groups. Organisational intervention research is required to evaluate the extent to which psychosocial work environment modifications might yield benefits in terms of reduced alcohol consumption.

This study used gender-specific cut-off scores for the identification of heavy alcohol consumption applied in several previous studies. However, there is inconsistency across the scientific literature on threshold locations, suggesting that had different thresholds been applied, alternative prevalence rates would have been produced. Going forward, researchers would do well to seek consistency across studies on the placement of cut-offs.

The strengths of this study include that it is the first to address alcohol use in a large and diverse sample of HAWs across regions and is the first study to utilize a stress model in this occupational sector. The study controlled for several possible confounding variables, permitting a focus on the contribution of psychosocial work factors to risk for heavy alcohol consumption.

However, some limitations should be considered. First, this study was cross-sectional, preventing definitive conclusions with regard to the direction of the reported relationships. On the basis of the current findings, it is not possible to determine if high ERI leads to heavy alcohol consumption (normal causation) or vice versa (reverse causation), or whether these constructs may mutually influence one another. Ibrahim (2009) observed a greater number of significant paths from work to health outcomes than reverse paths from health outcomes to work, suggesting

that the relationships between ERI and alcohol consumption found in the current study might reflect normal causation. On the other hand, associations have been found in neuropsychology literature between reward processing and drinking problems. Alcohol Use Disorder is associated with alterations in neural reward systems (Makris et al., 2008) and those affected find it particularly difficult to focus on conventional reward cues and engage in alternative (to alcohol) rewarding activities (Wrase et al., 2007). It is therefore possible that associations between ERI and alcohol use are bi-directional. Future studies should investigate relationships beyond a single direction: supplying evidence for bi-directional effects may advance theory on the complex mechanisms underlying stressor-health behaviour relationships (de Lange et al., 2004). A longitudinal study mapping the dynamics of the stressor-outcome association could remedy these design limitations (de Lange et al., 2003).

Individuals may demonstrate a tendency to underestimate their alcohol consumption (Midanik, 1988), suggesting that the true prevalence of heavy alcohol consumption in the study sample might be greater than reported here.

The possibility of a healthy worker effect having produced an underestimation of the prevalence of heavy alcohol consumption and the strength of association between ERI and heavy drinking cannot be discounted. Employees with high ERI or high alcohol consumption may have left the organisation or been on sick leave during the data collection period. To diminish the chances of those on sick leave not having the opportunity to participate, the survey instrument was available for an extended period of time (two months). There were potential differences between responders and non-responders with respect to ERI, OC, and drinking variables that may limit generalizability of the results.



The response rate for the study was low (22%). However, the sample was nevertheless large and representative of the population from which it was drawn. Cook et al. (2000) argued that response representativeness is more important than response rate in survey research. As HAWs often work in difficult situations (e.g. social isolation, conflict, or disaster zones), it is possible that resources such as time and computer access prevented completion of the survey.

We do not know if expatriates had elevated levels of drinking before commencing fieldwork, or if the nature of the work contributed to the development of heavy drinking. In future studies involving HAWs, it would be useful to establish alcohol consumption rates prior to deployment. Finally, studies are required that use a qualitative approach to enhance our understanding of the forces responsible for determining the status of the variables explored herein via quantitative means.

### **Conclusion**

This study found that almost one in five female humanitarian aid workers, and one in ten males, reported heavy alcohol consumption. Effort-reward imbalance was associated with a tripling of risk of heavy drinking among female humanitarian aid workers. Interventions to reduce effort-reward imbalance might help to reduce heavy drinking among this population. This research has addressed the gap in the literature on prevalence of and risk factors for heavy alcohol consumption among humanitarian aid workers.

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### Tables

Table 1

*Comparison of respondents' (N = 1980) demographic and occupational characteristics against organisation's employee population (N= 9062)*

	Survey respondents	Total organisation staff	Chi-square	p value
	N %	N %		
Gender				
Female	1063 (53.7%)	3374 (36.8%)	5.83	<b>.02*</b>
Male	917 (46.3%)	5688 (62.7%)		
Age				
< 35	569 (29.3%)	2495 (27.8%)	0.25	.97
35-44	697 (35.9%)	3175 (35%)		
45-54	492 (25.4%)	2404 (26.5%)		
> 54	181 (9.3%)	988 (11%)		
Region				
Americas	161 (8.1%)	317 (3.9%)	6.75	.24
Europe	274 (13.8%)	738 (9.2%)		
Africa	578 (29.2%)	3898 (48.5%)		
Middle East	421 (21.3%)	1763 (21.9%)		
North Africa				
Asia Pacific	301 (15.2%)	1312 (16.3%)		
Switzerland	245 (12.4%)	1034 (12.9%)		
Job category				
International staff	703 (38.4%)	2358 (26.2%)	3.14	.08
(expatriate)				
National staff (local)	1129 (61.6%)	6642 (73.8%)		

Significant findings are in bold: \* $p < .05$ .

Table 2

*Alcohol Consumption*

Alcohol Consumption/Audit C	Scores	Male ( <i>n</i> = 917), N (%)	Female ( <i>n</i> = 1063), N (%)	Total ( <i>n</i> = 1980) % (95% CI)
<hr/>				
Frequency of drinking: How often do you have a drink containing alcohol?		a	a	
Never	0	343 (37)	345 (33)	34.7 (32.7 – 36.9)
Monthly or less	1	173 (19)	246 (23)	21.2 (19.3-23.2)
2-4 times a month	2	188 (21)	237 (22)	21.5 (19.6-23.4)
2-3 times a week	3	137 (15)	163 (15)	15.2 (13.6-16.8)
≥ 4 times a week	4	76 (8.3)	72 (6.8)	7.5 (6.3-8.6)
<hr/>				
Typical quantity: How many drinks of alcohol do you have on a typical day when you are drinking?		b	b	
1-2	0	783 (85)	986 (93)	89.3 (88.0-90.7)
3-4	1	96 (11)	58 (5.5)	7.8 (6.6-9.0)
5-6	2	22 (2)	16 (1.5)	1.9 (1.4-2.5)
7-9	3	11 (1)	3 (0.3)	.7 (.4-1.1)
≥ 10	4	5 (0.5)	0 (0)	.3 (.1-.5)
<hr/>				
Frequency of heavy episodic drinking: How often do you have six or more drinks on one occasion?		c	c	
Never	0	590 (64)	824 (78)	71.4 (69.2-73.3)
Less than monthly	1	173 (19)	145 (14)	16.1 (14.6-17.7)
Monthly	2	84 (9)	68 (6.4)	7.7 (6.5-9)
Weekly	3	59 (6)	23 (2.2)	4.1 (3.3-5.1)

Daily or almost daily	4	11 (1)	3 (0.3)	.7 (.4-1.1)
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<sup>a</sup>  $\chi^2 = 10.02, df = 4, p < .05$ .

<sup>b</sup>  $\chi^2 = 32.60, df = 4, p < .001$ .

<sup>d</sup>  $\chi^2 = 52.77, df = 4, p < .001$ .

Table 3

*Associations Between Demographic Variables, Heavy Alcohol Consumption, ERI, and Over-commitment*

Variables		ERI (highest tertile)	Over- commitment (highest tertile)	Alcohol (heavy)
	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> ( %)	<i>N</i> ( %)
Gender				
Male	917 (46%)	370 (34%)	363 (40%)	94 (10%)
Female	1063 (54%)	312 (35%)	395 (37%)	186 (18%)
Chi square		.13	1.23	21.29
P-value		.72	.27	<b><i>p</i> &lt; .01**</b>
Marital status				
Married/co-habiting	1210 (62%)	408 (34%)	478 (40%)	146 (12%)
Single, divorced or widowed	753 (38%)	264 (35%)	274 (36%)	132 (18%)
Chi square		.37	1.91	11.40
P value		.54	.17	<b><i>p</i> &lt; .01**</b>
Age				
Less 34	569 (29%)	175 (31%)	184 (32%)	94 (17%)
35 -44	697 (36%)	244 (35%)	277 (40%)	86 (12%)
45 54	492 (25%)	174 (35%)	207 (42%)	68 (14%)
55+	181 (9%)	71 (39%)	73 (40%)	26 (14%)
Chi Square		5.53	12.46	4.57
P value		.14	<b><i>p</i> &lt; .01**</b>	.21
Family status				
Have children under	928 (48%)	294(32%)	368 (40%)	101 (11%)



18

Do not have children	1018 (52%)	372 (37%)	379 (37%)	171 (17%)
under 18				
Chi square		5.31	1.10	14.32
<i>P</i> value		<b>.02*</b>	.30	<b><i>p</i> &lt; .01**</b>

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Significant findings are in bold: \**p* < .05. \*\* *p* < .01.

Table 4

*Associations Between Work Characteristics, Heavy Alcohol Consumption, ERI, and Over-commitment*

Variables		Effort reward imbalance (highest tertile)	Over-commitment (highest tertile)	Alcohol (heavy)
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Regions				
America	161 (8%)	51 (32%)	47 (29%)	19 (12%)
Europe	274 (14%)	86 (31%)	80 (29%)	46 (17%)
Africa	578 (29%)	189 (33%)	244 (42%)	75 (13%)
Middle East, North Africa	421 (21%)	178 (42%)	182 (43%)	38 (9%)
Asia Pacific	301 (15%)	79 (26%)	98 (33%)	24 (8%)
Switzerland	245 (13%)	99 (40%)	107 (44%)	78 (32%)
Chi square		26.72	30.54	84.64
<i>p</i> value		<b><i>p</i> &lt; .001**</b>	<b><i>p</i> &lt; .001**</b>	<b><i>p</i> &lt; .001**</b>
Expatriate/local				
Expatriate	703 (38%)	247 (35%)	285 (41%)	150 (21%)
Local	1129 (62%)	379 (34%)	428 (38%)	106 (9%)
Chi square		.472	1.26	51.45
<i>p</i> value		.49	.26	<b><i>p</i> &lt; .001**</b>

Significant findings are in bold: \**p* < .05. \*\* *p* < .01.

Table 5

*Associations Between Secondary Traumatic Stress (STS), Post-traumatic stress disorder (PTSD), Heavy Alcohol Consumption, Effort-Reward Imbalance, and Over-commitment*

Variables		Effort reward imbalance (highest tertile)	Over-commitment (highest tertile)	Alcohol (heavy)
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Secondary Traumatic Stress				
(STS)				
At risk for STS	497 (38%)	254 (51%)	289 (58%)	90 (18%)
Not at risk STS	801 (62%)	183 (23%)	214 (27%)	78 (10%)
Chi square		109.68	127.67	19.07
<i>p</i> value		<b><i>p</i> &lt; .001**</b>	<b><i>p</i> &lt; .001**</b>	<b><i>p</i> &lt; .001**</b>
Post-traumatic stress				
disorder (PTSD)				
At risk for PTSD	1257 (63%)	292 (23%)	328 (26%)	168 (13%)
Not at risk for				
PTSD				
Chi square		191.73	216.46	1.71
<i>p</i> value		<b><i>p</i> &lt; .001**</b>	<b><i>p</i> &lt; .001**</b>	.19

Significant findings are in bold: \**p* < .05. \*\* *p* < .01.

Table 6

*Associations Between ERI, OC, and Heavy Alcohol Consumption (OR = odds ratio, CI = 95% Confidence Interval)*

		Model 2							
		Crude model		Model 1					
		Females		Males		Females		Males	
Stress indicators	N (%)	OR (95% CI)		OR (95% CI)		OR (95% CI)		OR (95% CI)	
Effort reward imbalance (ERI)									
Low ERI	325 (31%)	1.00 (reference)		1.00 (reference)		1.00 (reference)		1.00 (reference)	
Intermediate ERI	368 (35%)	<b>1.50 (1.01-2.25)*</b>		1.14 (0.66-1.98)		<b>1.71 (1.07-2.73)*</b>		1.17 (0.65-2.10)	
High ERI	370 (35%)	1.34 (0.89-2.02)		1.45 (0.86-2.45)		1.43 (0.88-2.32)		<b>1.46 (0.83-2.54)</b>	
Over-commitment (OC)									
Low OC	415 (39%)	1.00 (reference)		1.00 (reference)		1.00 (reference)		1.00 (reference)	
Intermediate OC	253 (24%)	0.92 (0.61-1.40)		1.14 (0.64-2.01)		0.99 (0.61-1.60)		1.37 (0.74-2.52)	
High OC	395 (37%)	1.08 (0.75-1.55)		1.27 (0.77-2.09)		1.08 (0.71-1.64)		1.36 (0.79-2.34)	

*Note.* OR = Odds ratio, 95% CI = 95% confidence interval.

Model 1 adjusted for age, marital status, family status, local/ expatriate status and region. Model 2 adjusted additionally for secondary traumatic stress and PTSD.

Significant findings are in bold: \* $p < .05$ . \*\* $p < .01$ .